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Aleksandra Nacewska-Twardowska

University of Łódź[1]

e-mail: aleksandra.nacewska-twarodwska@uni.lodz.pl

Factory Europe – changes in trade and GVC

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Abstract

Three main regions can be distinguished: Factory Asia, Factory Europe, and Factory North America with three main hubs: Germany, China, and the USA. These headquarters economies link Factories. The paper presents changes that have occurred in the regional pattern of supply-chain trade in the global economy and in the Factory Europe from 2005 to 2015. I2E trade matrixes are prepared for the first and last year of the analyzed period. Changes in sourcing and sales patterns are discussed in the same years. The article uses data in gross terms and measured by value added. As a result, I analyze the developments that took place at the beginning of the 21st century in the global economy and Factory Europe. Global value chains combined with China are gaining importance in the global economy. In Factory Europe, in connection with the enlargement of the European Union, new member states are becoming an essential part of GVC combined with other mega-regional blocks by Germany.

Keywords: global value chains, Factory Europe, gross exports, value-added exports

JEL classification codes: F13, F15, F6

Introduction

In the second half of the twentieth century, world production accelerated and increased global trade. This was influenced by many factors, the most important of which is technical development, modern and more efficient means of transport, and the development of the Internet. These changes were accompanied by closer economic cooperation of countries. All these factors can be related to globalization. As a result, the world has become smaller; both production and consumption became possible all over the world. Increasingly, we meet with the terms that suggest that the development

[1] Department of International Business and Trade, Institute of International Economics, Faculty of Economics and Sociology

of economic and financial cooperation has meant that we are dealing with a unified global economy, including developed countries and many developing countries. These countries include a network of interrelationships that is strong enough to create global value chains (GVC).

Is this the reality, however? Are we dealing with a single economic creation? Alternatively, maybe the central role is played by regional economies, gathering several countries from the region. As Baldwin suggests, the term global value chains do not describe what can be seen in the global economy (Inomata, 2017). In studies connected with changes occurring in global value production chains, in the context of region blocks, the formulas describing the cooperation of countries as interrelated production hubs are much better. The three main ones are: Factory Asia, Factory North America, and Factory Europe.

The text contains three major parts. The first part describes previously conducted studies on global value chains and trade in value added. The second part gives details of one of the most important economic regions of the global economy, namely Factory Europe, in the context of the global economy. The third part contains a description of the results of the calculation in relation to GVC and European countries.

Global value chains and trade in value added

The division of production into many steps, which are carried out in different countries, has led to the creation of links between enterprises on a global scale. Often, as consumers, we do not realize that most of the products that we buy, at least in part, arise thanks to international trade. Intermediate products or materials from abroad are used for domestic production. Domestic components are assembled abroad, and on the other hand, we consume after-sale servicing in the country. The turn of the 20th and 21st centuries significantly changed international trade. These changes have created difficulties in understanding trade and trade policy. One of the fundamental problems, apart from the lack of a coherent theory of international trade, is the problematic access to real international trade statistics. To understand the connections in the global economy, it is necessary to assess the authentic connections that link the economies.

The description of trade in the classical sense of Smith, Ricardo, or Heckscher-Olin was based on three basic premises:

- markets are perfectly competitive;
- products are homogeneous;
- international trade is based on final goods.

These basic premises, together with the development of trade, began to be challenged. Classical and neoclassical paradigm was shifted. In the mid-1970s, Grubel and Lloyd described the intra-industry trade phenomenon. In turn, in the 1980s, Helpman and Krugman (1985) introduced a coherent

theory of trade in a non-perfect competition. Subsequent research related to the division of production, the creation of production chains connecting different countries or multiple transfers of value added questioned the last classical premises.

Fragments of assumptions that can form GVC paradigm together began to appear in many studies (Inomata, 2017). At the root is the theory of production described by Jones and Kierzkowski in the early 90s. Then, research on intermediate goods appeared (Feenstra and Hanson, 1996). Baldwin (2006) described the concept of unbundling, and Grossman and Rossi-Hansberg (2006) presented trade in tasks. The complexity of methodological sources supports the creation of many terms: international production, international fragmentation of production, the second unbundling, trade in task, vertical specialization. All these terms combine a description of the real economy, which consists of the flow of value added on a global scale. The export and import of value added is the basis of global value chains.

At the same time, works related to the proper measurement of trade flows also began to appear. Changes in the world economy combined with the fragmentation and emergence of GVC have caused the inadequacy of the statistics traditionally used. As noted by the OECD and WTO under long and divided production chains, circular trade takes place (2012). An example can be repeated trade in goods between the USA and Mexico or trade in the European Union. To measure hidden trade in value added underlying gross trade, we need to go along through the global supply chains (Johnson 2014). This approach is feasible on a small scale when we consider individual products, like the case of the iPod, described by Linden, Kraemer, and Dedrick (2009). Then, an input-output approach of trade flow in value-added terms has been clarified, inter alia, by Koopman et al. (2010) and Stehrer et al. (2012). The OECD and WTO have also described a conceptual framework for tracking value-added at the beginning of the 21st century. It is possible to decompose any particular product with value Vp into the value-added generated in country i such that the total value of:

$$V^p = \sum_i VA_i^p$$

This simple formula complicates when aggregating up for a group of products or the whole economy. As a result, it is necessary to use data that has been aggregated to some extent. Although the use of international input-output table allows decomposing gross trade into value added components (Figure 1).

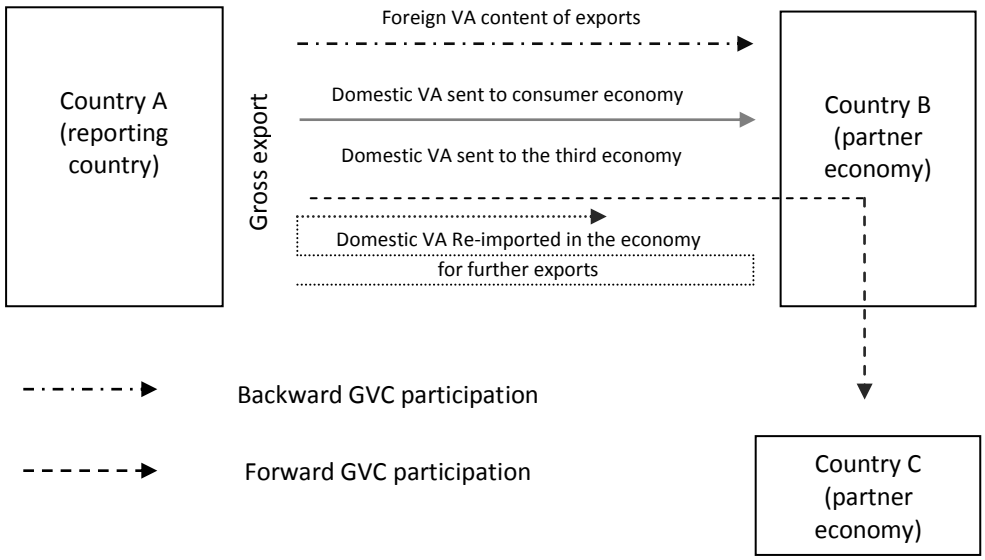

Fig. 1 Visualization of the value added components of gross exports and GVC trade flows based on the WTO-OECD scheme, source: OECD-WTO TiVA Database.

The most straightforward breakdown of gross exports is foreign value added (FVA), and domestic value added (DVA) content of exports. The first one corresponds to the value added of inputs that were imported in order to produce intermediate or final goods/services to be exported. The second, domestic value added content of export, is decomposed of three elements (OECD and WTO 2012):

1. Domestic value added sent to consumer economy (DDVA – direct domestic value added) corresponds to the domestic value added embodied either in final or intermediate goods or services that are directly consumed by the importing economy.

2. Domestic value added sent to third economies (IDVA – indirect domestic value added) represents the domestic value added contained in intermediates (goods or services) exported to a first economy that re-exports them to a third economy as embodied in other goods or services.

3. Domestic value added re-imported in the economy outlines the domestic value added of exported intermediates, or inputs, that is sent back to the economy of origin as embodied in other intermediates and used to produce exports. Such value added round-trip between two (or more) economies highlights the domestic value added content present in an economy's imports.

Figure 1 also presents the exchange of value added among global value chains. On the one hand, domestic value added sent to third economies corresponds to forward GVC participation. It catches DVA contribution (from country A) sent to partner economy (country B) for further processing and then export through the value chain to third economies (country C). It reflects downstream links in the global value chain. On the other hand, foreign value added content of exports corresponds to backward GVC participation (upstream links in the chain). It represents FVA contribution imported to

country A to produce intermediate or final goods/services and afterward exported to partner economy (country B).

Factory Europe in global trade

The analysis of trade data with added value allows indicating the depth and intensity of connections between states at the regional and global level. Baldwin and Lopez-Gonzalez (2015) analyzed global patterns of supply-chain distinguishing two main types of connections:

- I2P – Import to Produce, which is the broadest type of connections and includes all imported intermediate inputs, including raw materials and services.
- I2E – Import to Export is a concept that is very close to GVC. It is the foreign intermediates used for the production of goods and services that are subsequently exported.

Firstly, in the I2E analysis, they indicated that in 2009, on average, about 20% of export is an added value that was created abroad. Figure 2 and 3 show the results of the share of foreign value added in exports in 2015. The average share of foreign value added has not changed in relation to the year 2009 described by them. The countries with the largest share of foreign value added in exports are Luxembourg and Malta. Higher than average share is characteristic for small and medium nations. Examples are countries from Central Europe (Slovakia, Hungary, the Czech Republic) or Southeast Asia (Malaysia, Vietnam, Singapore). The rather low US share (9%) is interesting. Large European economies (Germany, France, Italy) are slightly above the world average.

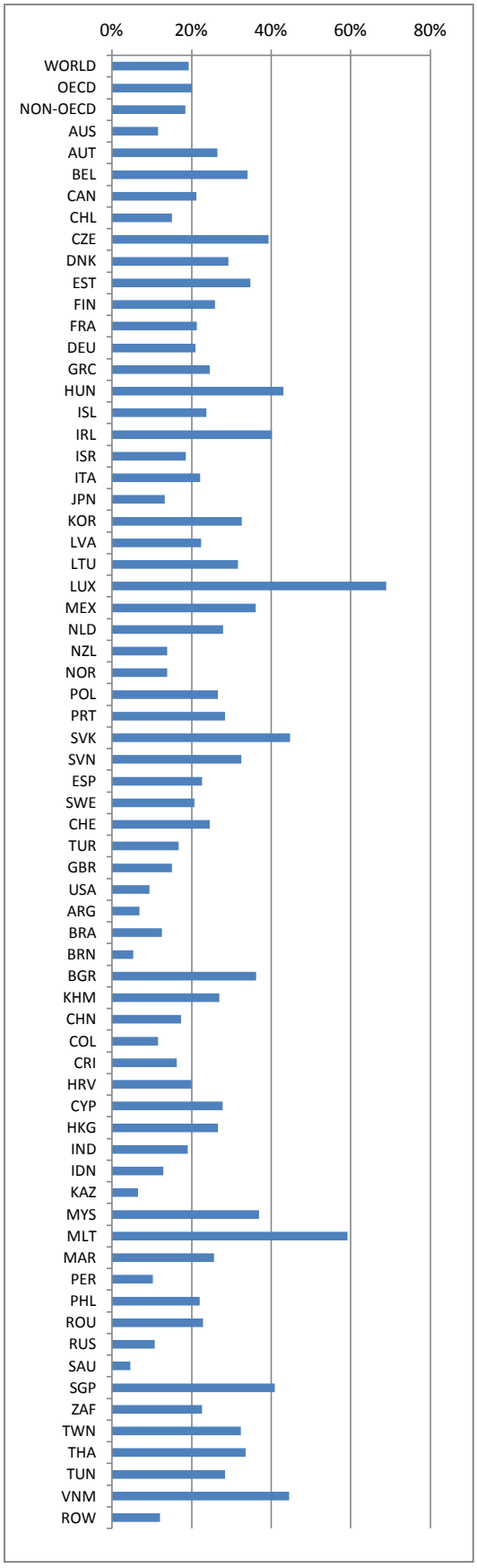

Fig. 2 Foreign value added content of gross exports in 2015 by countries, source: author's calculation, OECD-WTO TiVA Database.

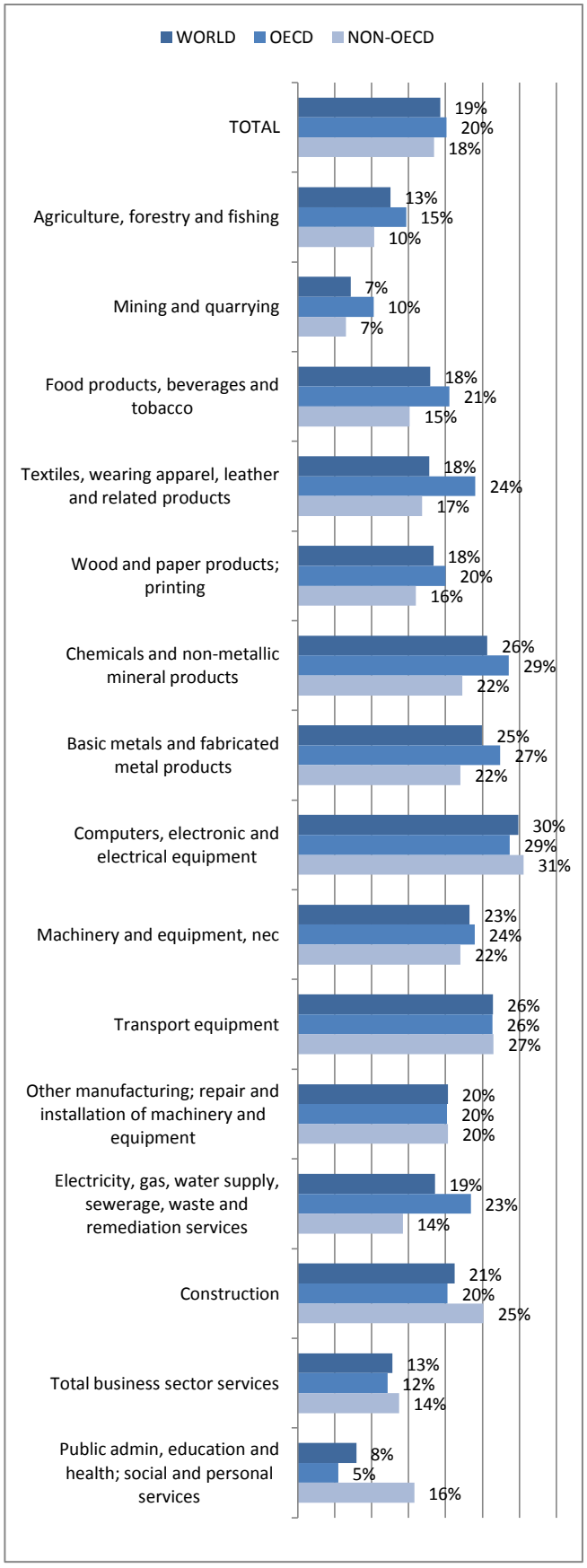

Fig. 3 Foreign value added content of gross exports in 2015 by industry, source: author's calculation, OECD-WTO TiVA Database.

Secondly, the share of foreign value added in exports is very diverse in different industries (Figure 3). The highest share of around 30% is in computers, electronic and electrical equipment, and transport equipment and chemicals and non-metallic mineral products. In turn, mining and quarrying and public services are characterized by the lowest share of foreign value added in exports. In the case of the latter, there is a big difference between the OECD and Non-OECD countries. OECD's share is three times higher than Non-OECD (16%).

These data indicate that the share of individual countries in global value chains is not very high. This is also confirmed by data from the matrix diagram for Import to Export below (I2E). Each element of the matrix shows foreign value added content of gross exports by column nation from row nation as % of all I2E flows in TIVA OECD 2018 data base. To indicate the most important relationships, I zero-out any bilateral flow that is less than 0.25% share in the global trade of foreign value added content of gross exports. Just like Baldwin and Lopez-Gonzales prepared their data (2015) the rows and columns are arranged to reflect regions: European Union along with the European Economic Area, then Asia and North America. From South America in the matrix diagram is only Brazil. Other countries in the region have too small shares in world trade.

Figure 4 and 5 is the matrix diagram that shows I2E flows in 2005 and 2015. Data analysis allows identifying three main regions in which international exchange takes place. These are already mentioned Factory Asia, Factory North America, and Factory Europe. In 2005, these regions primarily led the regional international trade creating production hubs. These hubs were related to a small extent. The country that stands out is the US, which was the only one that participated to a significant extent in global value chains. This is indicated by the values in the column and row relating to the USA. It is a country which, apart from the regional exchange with Canada and Mexico, uses foreign value added in its exports (values in a column for the USA) and provides domestic value added for further exports (values in a row for the US). The region also has a significant share of France, Italy, the United Kingdom and to a lesser extent the Netherlands and Spain. At Factory Asia, there is no single dominant nation in 2005.

	AUT	BEL	FRA	DEU	ITA	NLD	POL	ESP	GBR	NOR	CHE	RUS	CHN	IND	KOR	MYS	JPN	SAU	SGP	TWN	THA	AUS	CAN	MEX	USA	BRA
AUT				0,37%																						
BEL						0,28%																				
FRA		0,28%		0,67%	0,43%			0,30%	0,35%																0,33%	
DEU	0,32%	0,26%	0,55%		0,39%	0,42%			0,52%		0,29%														0,48%	
IRL									0,32%																0,27%	
ITA			0,48%	0,60%					0,26%																	
NLD				0,31%																					0,33%	
POL																										
ESP			0,42%	0,36%	0,28%																					
GBR			0,37%	0,48%						0,33%															0,46%	
CHE				0,39%																						
RUS																										
CHN				0,28%											1,02%		1,09%			0,92%					0,56%	
HKG																										
IND																		0,37%								
KOR													0,53%				0,68%								0,47%	
MYS																										
JPN													0,78%		0,28%			0,32%				0,28%			0,74%	
SGP																										
TWN																	0,49%									
THA																										
VNM																										
AUS																										
CAN																									1,60%	
MEX																									1,15%	
USA			0,37%	0,88%	0,36%				0,74%				1,44%		0,43%		1,21%	0,50%		0,30%			3,14%	1,46%		0,30%
BRA																										

Fig. 4 Global I2E trade matrix 2005, source: author's calculation, OECD-WTO TiVA Database.

Notes: Foreign value added content of gross exports by column nation from row nation as % of all I2E flows in TIVA OECD 2018 data base. Only values greater than 0.25% share in global trade of foreign value added content of gross exports.

	AUT	BEL	FRA	DEU	ITA	NLD	POL	ESP	GBR	NOR	CHE	RUS	CHN	IND	KOR	MYS	JPN	SAU	SGP	TWN	THA	AUS	CAN	MEX	USA	BRA
AUT				0,30%																						
BEL																										
FRA				0,58%					0,28%																0,32%	
DEU	0,28%		0,44%		0,30%	0,36%	0,28%		0,36%	0,27%			0,41%												0,46%	
IRL									0,28%																0,37%	
ITA			0,26%	0,37%								0,26%														
NLD				0,26%																					0,28%	
POL				0,25%																						
ESP																										
GBR			0,26%	0,41%									0,29%												0,40%	
CHE				0,36%																						
RUS													0,25%													
CHN			0,26%	0,63%								0,40%			1,62%	0,40%	1,11%	0,36%	0,30%	1,09%	0,34%	0,68%	0,28%		1,43%	0,37%
HKG																										
IND													0,50%												0,25%	
KOR													0,93%				0,36%								0,44%	
MYS													0,28%													
JPN													0,89%									0,27%			0,55%	
SGP																									0,26%	
TWN													0,31%													
THA													0,33%													
VNM													0,40%													
AUS													0,27%													
CAN													0,29%												1,38%	
MEX													0,50%												1,12%	
USA				0,64%					0,51%				2,69%	0,35%	0,38%		0,58%	0,27%					2,06%	1,31%		
BRA																									0,30%	

Fig. 5 Global I2E trade matrix 2015, source: author's calculation, OECD-WTO TiVA Database.

Notes: Foreign value added content of gross exports by column nation from row nation as % of all I2E flows in TIVA OECD 2018 data base. Only values greater than 0.25% share in global trade of foreign value added content of gross exports.

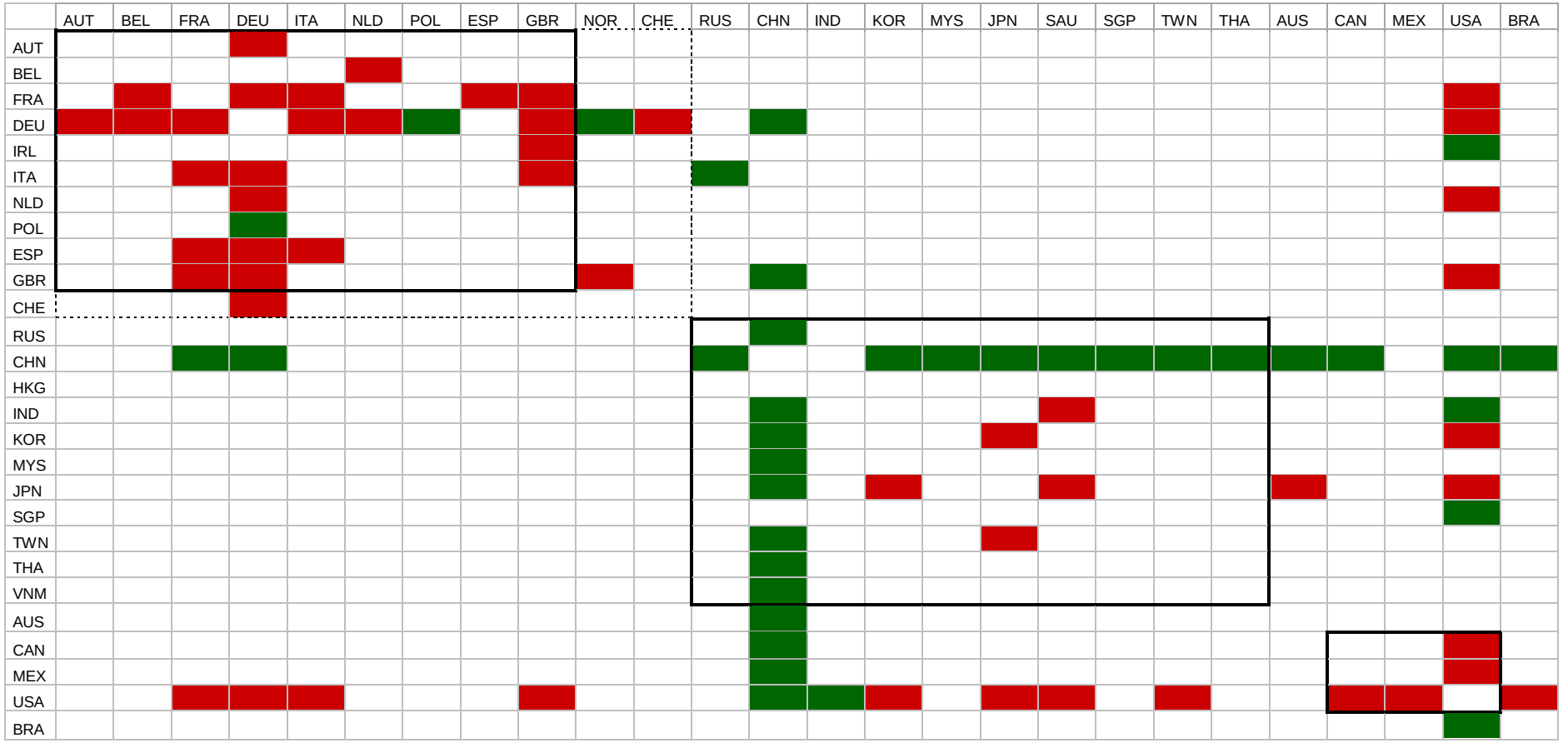

Fig. 6 Change in foreign value added content of gross exports in the years 2005-2015, source: author's calculation, OECD-WTO TiVA Database. Notes: The matrix cells in which there is a decrease share in I2E in the years 2005-2015 are marked in red. In the case of an increase in that share matrix cells are marked in green. Countries from figure 4 and 5 are analyzed.

In 2015, changes in foreign value added flows in exports changed significantly. The most important changes include:

- Increase of China's share in global value chains. China has become both a more significant recipient of foreign value added (CHN column) and a donor (CHN row). They increased their influence and regional trade with other countries of the Factory Asia and to a greater extent joined in the trade with Factory Europe and Factory North America.
- US and German share in GVC decreased.

Finally, these changes are shown in Figure 6. This is a matrix diagram of I2E share changes in the years 2005-2015. In the case of increased in foreign value added content of gross exports share in 2015 in relation to 2005 cells are marked in green. In the opposite case, cells are marked in red. A lot of red cells are in Factory Europe and Factory North America. This indicates a decline in the importance of so far significant links within the global value chains in the regions. Against this trend, China, as mentioned earlier, stands out, which strengthened its participation in the GVC. In the regional context, Poland has increased its share in GVC combined with Germany. These changes show that a closer look at individual regions is indeed essential. The next part will present changes in Factory Europe.

Factory Europe – a deeper insight

Economic integration in Europe began in the mid-twentieth century since the creation of the European Coal and Steel Community. In the following years, the ECSC changed into European Communities and finally into the European Union (EU)[2]. The current shape of the Union was strongly influenced by political changes and economic transformation of the countries of Central and Eastern Europe in the late 1980s and early 1990s. The breakup of the Union of Soviet Socialist Republics has allowed satellite countries to pursue their own foreign and economic policy. The enlargement of the European Union in 2004 and 2007 became the culmination of their efforts and big single market in Europe was created. It allows for goods, services, capital, and people to move around a union as freely as they do within a single country. The introduction of the latter freedom was spread over time. As a result, the EU countries and those belonging to the European Free Trade Association increased mutual trade. At the same time, due to the different level of economic growth and substantial differences in production costs, the geographical structure of production and trade changed.

[2] The European Union, as an international organization, was established after the adoption of the Lisbon Treaty on December 1, 2009. However, the name itself has been used in literature since the early 1990s. Also, in this text, this name will be used for the definition of the European Community before 2009.

The new member states have been directly involved in regional value chains and indirectly in global value chains. Figure 7 indicates an over-average share (of around 20%) of the majority of Central and Eastern European countries.

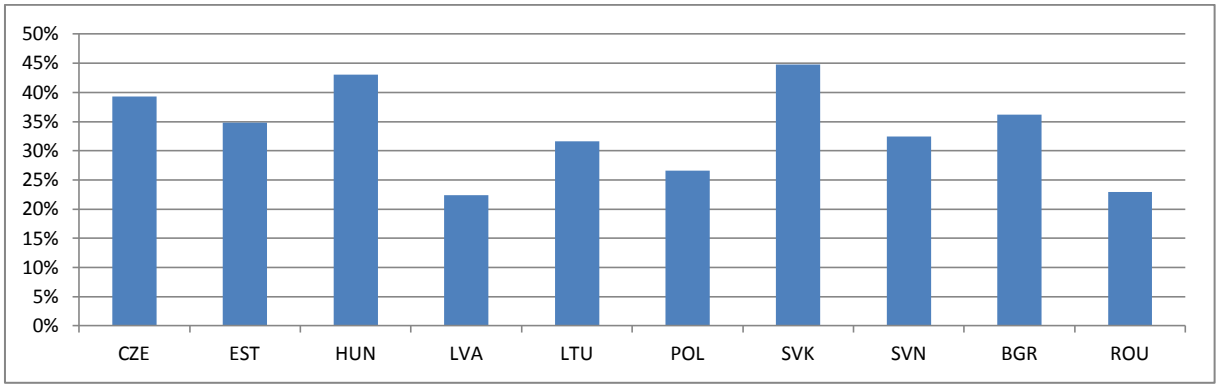

Fig. 7 Foreign value added content of gross exports in 2015 by countries, source: author's calculation, OECD-WTO TiVA Database.

Analogously to matrix diagram 4 and 5, I prepared a matrix diagram for Factory Europe for the years 2005 and 2015. Each element of the matrix shows foreign value added content of gross exports by column nation from row nation as % of all I2E flows in Factory Europe. The darker the cell color, the larger the share of value chains in Europe.

	AUT	BEL	BGR	HRV	CYP	CZE	DNK	EST	FIN	FRA	DEU	GRC	HUN	IRL	ITA	LVA	LTU	LUX	MLT	NLD	POL	PRT	ROU	SVK	SVN	ESP	SWE	GBR	ISL	NOR	CHE
AUT	0,0%	0,1%	0,0%	0,0%	0,0%	0,2%	0,0%	0,0%	0,0%	0,2%	1,0%	0,0%	0,2%	0,0%	0,3%	0,0%	0,0%	0,0%	0,0%	0,1%	0,1%	0,0%	0,0%	0,1%	0,1%	0,1%	0,1%	0,1%	0,0%	0,0%	0,3%
BEL	0,1%	0,0%	0,0%	0,0%	0,0%	0,1%	0,1%	0,0%	0,1%	0,8%	0,9%	0,0%	0,1%	0,3%	0,4%	0,0%	0,0%	0,5%	0,0%	0,6%	0,1%	0,0%	0,0%	0,0%	0,0%	0,2%	0,2%	0,4%	0,0%	0,1%	0,2%
BGR	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%
HRV	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%
CYP	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%
CZE	0,1%	0,1%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,1%	0,6%	0,0%	0,1%	0,0%	0,1%	0,0%	0,0%	0,0%	0,0%	0,0%	0,1%	0,0%	0,0%	0,2%	0,0%	0,1%	0,1%	0,1%	0,0%	0,0%	0,0%
DNK	0,0%	0,1%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,1%	0,2%	0,3%	0,0%	0,0%	0,1%	0,1%	0,0%	0,0%	0,0%	0,0%	0,1%	0,0%	0,0%	0,0%	0,0%	0,0%	0,1%	0,5%	0,1%	0,0%	0,1%	0,1%
EST	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%
FIN	0,1%	0,1%	0,0%	0,0%	0,0%	0,0%	0,1%	0,0%	0,0%	0,1%	0,3%	0,0%	0,0%	0,0%	0,1%	0,0%	0,0%	0,0%	0,0%	0,1%	0,0%	0,0%	0,0%	0,0%	0,0%	0,1%	0,4%	0,1%	0,0%	0,1%	0,1%
FRA	0,3%	1,1%	0,0%	0,0%	0,0%	0,2%	0,2%	0,0%	0,1%	0,0%	2,2%	0,1%	0,3%	0,4%	1,4%	0,0%	0,0%	0,2%	0,0%	0,6%	0,2%	0,2%	0,1%	0,1%	0,1%	1,2%	0,4%	1,0%	0,0%	0,1%	0,8%
DEU	1,6%	1,2%	0,0%	0,1%	0,0%	1,0%	0,7%	0,0%	0,4%	2,5%	0,0%	0,1%	0,9%	0,6%	2,0%	0,0%	0,0%	0,5%	0,0%	1,2%	0,7%	0,2%	0,1%	0,4%	0,2%	1,2%	1,0%	1,4%	0,0%	0,2%	1,7%
GRC	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,1%	0,0%	0,0%	0,1%	0,1%	0,0%	0,0%	0,0%	0,1%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,1%	0,0%	0,0%	0,0%
HUN	0,1%	0,0%	0,0%	0,0%	0,0%	0,1%	0,0%	0,0%	0,0%	0,1%	0,4%	0,0%	0,0%	0,0%	0,1%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,1%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%
IRL	0,0%	0,1%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,2%	0,3%	0,0%	0,0%	0,0%	0,2%	0,0%	0,0%	0,1%	0,0%	0,1%	0,0%	0,0%	0,0%	0,0%	0,0%	0,1%	0,1%	0,3%	0,0%	0,0%	0,2%
ITA	0,3%	0,4%	0,0%	0,1%	0,0%	0,2%	0,2%	0,0%	0,1%	1,4%	1,5%	0,1%	0,2%	0,3%	0,0%	0,0%	0,0%	0,2%	0,1%	0,2%	0,2%	0,1%	0,2%	0,1%	0,1%	0,7%	0,2%	0,6%	0,0%	0,1%	0,7%
LVA	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%
LTU	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%
LUX	0,0%	0,1%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,1%	0,1%	0,0%	0,0%	0,0%	0,1%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,1%
MLT	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%
NLD	0,2%	1,3%	0,0%	0,0%	0,0%	0,1%	0,2%	0,0%	0,1%	0,6%	1,4%	0,0%	0,1%	0,2%	0,5%	0,0%	0,0%	0,1%	0,0%	0,0%	0,1%	0,1%	0,0%	0,0%	0,0%	0,3%	0,3%	0,5%	0,0%	0,1%	0,3%
POL	0,1%	0,1%	0,0%	0,0%	0,0%	0,2%	0,1%	0,0%	0,0%	0,2%	0,7%	0,0%	0,1%	0,0%	0,2%	0,0%	0,0%	0,0%	0,0%	0,1%	0,0%	0,0%	0,0%	0,1%	0,0%	0,1%	0,1%	0,1%	0,0%	0,1%	0,1%
PRT	0,0%	0,1%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,1%	0,1%	0,0%	0,0%	0,0%	0,1%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,2%	0,0%	0,1%	0,0%	0,0%	0,0%
ROU	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,1%	0,0%	0,0%	0,0%	0,1%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%
SVK	0,1%	0,0%	0,0%	0,0%	0,0%	0,1%	0,0%	0,0%	0,0%	0,0%	0,2%	0,0%	0,1%	0,0%	0,1%	0,0%	0,0%	0,0%	0,0%	0,0%	0,1%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%
SVN	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,1%	0,0%	0,0%	0,0%	0,1%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%
ESP	0,1%	0,3%	0,0%	0,0%	0,0%	0,1%	0,1%	0,0%	0,1%	0,9%	0,8%	0,0%	0,1%	0,2%	0,5%	0,0%	0,0%	0,1%	0,0%	0,2%	0,1%	0,5%	0,0%	0,0%	0,0%	0,0%	0,1%	0,4%	0,0%	0,1%	0,3%
SWE	0,1%	0,2%	0,0%	0,0%	0,0%	0,1%	0,5%	0,0%	0,3%	0,2%	0,6%	0,0%	0,1%	0,1%	0,2%	0,0%	0,0%	0,0%	0,0%	0,2%	0,1%	0,0%	0,0%	0,0%	0,0%	0,1%	0,0%	0,3%	0,0%	0,3%	0,1%
GBR	0,2%	0,8%	0,0%	0,0%	0,0%	0,2%	0,3%	0,0%	0,2%	1,3%	2,0%	0,1%	0,2%	1,6%	0,8%	0,0%	0,0%	1,2%	0,1%	0,8%	0,1%	0,1%	0,0%	0,1%	0,0%	0,7%	0,5%	0,0%	0,0%	0,2%	0,6%
ISL	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%
NOR	0,0%	0,4%	0,0%	0,0%	0,0%	0,0%	0,4%	0,0%	0,1%	0,7%	0,6%	0,0%	0,0%	0,2%	0,2%	0,0%	0,0%	0,0%	0,0%	0,4%	0,1%	0,0%	0,0%	0,0%	0,0%	0,2%	0,5%	0,8%	0,0%	0,0%	0,1%
CHE	0,2%	0,1%	0,0%	0,0%	0,0%	0,1%	0,1%	0,0%	0,0%	0,4%	0,9%	0,0%	0,1%	0,1%	0,4%	0,0%	0,0%	0,5%	0,0%	0,1%	0,0%	0,0%	0,0%	0,0%	0,0%	0,2%	0,1%	0,2%	0,0%	0,0%	0,0%
SUM	3,7%	6,6%	0,2%	0,3%	0,2%	2,7%	3,1%	0,2%	1,8%	10,3%	15,3%	0,5%	2,8%	4,4%	8,1%	0,1%	0,1%	3,6%	0,3%	5,0%	2,2%	1,4%	0,7%	1,3%	0,7%	5,6%	4,6%	6,7%	0,1%	1,5%	5,8%

Fig. 8 Factory Europe I2E trade matrix 2005, source: author's calculation, OECD-WTO TiVA Database.

	AUT	BEL	BGR	HRV	CYP	CZE	DNK	EST	FIN	FRA	DEU	GRC	HUN	IRL	ITA	LVA	LTU	LUX	MLT	NLD	POL	PRT	ROU	SVK	SVN	ESP	SWE	GBR	ISL	NOR	CHE
AUT	0,0%	0,1%	0,0%	0,0%	0,0%	0,2%	0,0%	0,0%	0,0%	0,2%	1,1%	0,0%	0,2%	0,0%	0,3%	0,0%	0,0%	0,0%	0,0%	0,1%	0,1%	0,0%	0,1%	0,1%	0,1%	0,1%	0,1%	0,1%	0,0%	0,0%	0,3%
BEL	0,1%	0,0%	0,0%	0,0%	0,0%	0,1%	0,1%	0,0%	0,0%	0,6%	0,8%	0,0%	0,1%	0,3%	0,3%	0,0%	0,0%	0,4%	0,0%	0,6%	0,1%	0,0%	0,0%	0,0%	0,0%	0,1%	0,1%	0,3%	0,0%	0,0%	0,2%
BGR	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,1%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%
HRV	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%
CYP	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%
CZE	0,1%	0,1%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,1%	0,7%	0,0%	0,1%	0,0%	0,1%	0,0%	0,0%	0,0%	0,0%	0,1%	0,2%	0,0%	0,0%	0,3%	0,0%	0,1%	0,0%	0,1%	0,0%	0,0%	0,1%
DNK	0,0%	0,1%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,1%	0,1%	0,3%	0,0%	0,0%	0,2%	0,1%	0,0%	0,0%	0,0%	0,0%	0,1%	0,1%	0,0%	0,0%	0,0%	0,0%	0,0%	0,2%	0,1%	0,0%	0,1%	0,1%
EST	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%
FIN	0,0%	0,1%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,1%	0,3%	0,0%	0,0%	0,1%	0,1%	0,0%	0,0%	0,0%	0,0%	0,1%	0,1%	0,0%	0,0%	0,0%	0,0%	0,0%	0,2%	0,1%	0,0%	0,0%	0,0%
FRA	0,2%	1,1%	0,0%	0,0%	0,0%	0,2%	0,1%	0,0%	0,1%	0,0%	2,1%	0,0%	0,2%	0,9%	1,0%	0,0%	0,0%	0,5%	0,0%	0,6%	0,3%	0,2%	0,1%	0,2%	0,0%	0,9%	0,2%	0,8%	0,0%	0,1%	0,6%
DEU	1,4%	1,1%	0,1%	0,0%	0,0%	1,3%	0,7%	0,1%	0,3%	2,4%	0,0%	0,1%	1,0%	0,9%	1,6%	0,0%	0,0%	1,0%	0,1%	1,2%	1,1%	0,2%	0,2%	0,6%	0,1%	1,0%	0,6%	1,4%	0,0%	0,1%	1,8%
GRC	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,1%	0,0%	0,0%	0,0%	0,1%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%
HUN	0,1%	0,0%	0,0%	0,0%	0,0%	0,1%	0,0%	0,0%	0,0%	0,1%	0,4%	0,0%	0,0%	0,0%	0,1%	0,0%	0,0%	0,0%	0,0%	0,0%	0,1%	0,0%	0,0%	0,1%	0,0%	0,1%	0,0%	0,0%	0,0%	0,0%	0,0%
IRL	0,0%	0,2%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,2%	0,4%	0,0%	0,1%	0,0%	0,2%	0,0%	0,0%	0,1%	0,0%	0,2%	0,1%	0,0%	0,0%	0,0%	0,0%	0,1%	0,1%	0,4%	0,0%	0,0%	0,4%
ITA	0,3%	0,3%	0,1%	0,0%	0,0%	0,2%	0,1%	0,0%	0,1%	0,9%	1,5%	0,1%	0,2%	0,4%	0,0%	0,0%	0,0%	0,3%	0,0%	0,2%	0,3%	0,1%	0,1%	0,1%	0,1%	0,5%	0,1%	0,4%	0,0%	0,1%	0,7%
LVA	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%
LTU	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%
LUX	0,0%	0,1%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,1%	0,2%	0,0%	0,0%	0,3%	0,1%	0,0%	0,0%	0,0%	0,0%	0,1%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,1%	0,0%	0,0%	0,0%
MLT	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%
NLD	0,1%	0,9%	0,0%	0,0%	0,0%	0,1%	0,2%	0,0%	0,1%	0,5%	1,3%	0,0%	0,1%	0,5%	0,3%	0,0%	0,0%	0,1%	0,1%	0,0%	0,2%	0,1%	0,0%	0,1%	0,0%	0,2%	0,1%	0,4%	0,0%	0,1%	0,2%
POL	0,1%	0,1%	0,0%	0,0%	0,0%	0,4%	0,1%	0,0%	0,1%	0,2%	1,1%	0,0%	0,2%	0,1%	0,2%	0,0%	0,0%	0,0%	0,0%	0,1%	0,0%	0,0%	0,1%	0,2%	0,0%	0,1%	0,1%	0,2%	0,0%	0,1%	0,1%
PRT	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,1%	0,1%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,2%	0,0%	0,1%	0,0%	0,0%	0,0%
ROU	0,1%	0,1%	0,0%	0,0%	0,0%	0,1%	0,0%	0,0%	0,0%	0,1%	0,2%	0,0%	0,1%	0,0%	0,1%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%
SVK	0,1%	0,0%	0,0%	0,0%	0,0%	0,2%	0,0%	0,0%	0,0%	0,1%	0,3%	0,0%	0,1%	0,0%	0,1%	0,0%	0,0%	0,0%	0,0%	0,0%	0,1%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%
SVN	0,1%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,1%	0,0%	0,0%	0,0%	0,1%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%
ESP	0,1%	0,2%	0,1%	0,0%	0,0%	0,1%	0,1%	0,0%	0,0%	0,8%	0,9%	0,0%	0,1%	0,2%	0,5%	0,0%	0,0%	0,1%	0,0%	0,2%	0,1%	0,5%	0,0%	0,1%	0,0%	0,0%	0,1%	0,4%	0,0%	0,0%	0,3%
SWE	0,1%	0,2%	0,0%	0,0%	0,0%	0,1%	0,3%	0,0%	0,2%	0,2%	0,6%	0,0%	0,1%	0,1%	0,1%	0,0%	0,0%	0,1%	0,0%	0,2%	0,1%	0,0%	0,0%	0,0%	0,0%	0,1%	0,0%	0,2%	0,0%	0,2%	0,2%
GBR	0,1%	0,7%	0,0%	0,0%	0,0%	0,2%	0,3%	0,0%	0,1%	1,0%	1,8%	0,1%	0,1%	2,1%	0,6%	0,0%	0,0%	1,9%	0,2%	0,8%	0,2%	0,1%	0,1%	0,1%	0,0%	0,6%	0,3%	0,0%	0,0%	0,2%	0,6%
ISL	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%
NOR	0,0%	0,3%	0,0%	0,0%	0,0%	0,0%	0,4%	0,0%	0,1%	0,2%	0,6%	0,0%	0,0%	0,1%	0,1%	0,0%	0,0%	0,1%	0,0%	0,5%	0,1%	0,0%	0,0%	0,0%	0,0%	0,1%	0,3%	0,5%	0,0%	0,0%	0,0%
CHE	0,2%	0,1%	0,0%	0,0%	0,0%	0,1%	0,1%	0,0%	0,0%	0,4%	1,1%	0,0%	0,1%	0,4%	0,3%	0,0%	0,0%	0,7%	0,0%	0,2%	0,1%	0,0%	0,0%	0,0%	0,0%	0,1%	0,1%	0,2%	0,0%	0,0%	0,0%
SUM	3,4%	6,0%	0,6%	0,3%	0,2%	3,5%	2,7%	0,3%	1,2%	8,4%	16,4%	0,4%	3,0%	6,8%	6,4%	0,2%	0,3%	5,6%	0,6%	5,4%	3,5%	1,4%	1,0%	1,9%	0,6%	4,6%	2,7%	5,7%	0,1%	1,2%	5,7%

Fig. 9 Factory Europe I2E trade matrix 2015, source: author's calculation, OECD-WTO TiVA Database.

In 2005, Germany dominated in global value chains, measured by the share of foreign value added in exports. Their overall share in GVC in Europe was over 15% (Figure 8). The most important trading partners providing domestic value added for Germany were France, the United Kingdom, Italy, the Netherlands, and Austria. The European GVC also played an important role in France, Italy, the United Kingdom, and Belgium. Their share was from 10.3% to 6.6%, respectively. The total share of new member states in I2E in Europe was about 13%.

In ten years, the shares of individual nations in GVC in Europe significantly changed (Figure 9). Germany maintained its dominant position by increasing its share to 16.4%. At the same time, all previously mentioned significant nations in Factory Europe have reduced their share in the European GVC. These changes are summarized in Figure 10.

	AUT	BEL	BGR	HRV	CYP	CZE	DNK
2005	3,74%	6,61%	0,23%	0,31%	0,16%	2,70%	3,09%
2015	3,36%	5,97%	0,56%	0,25%	0,15%	3,54%	2,72%
Absolute difference in percentage points	-0,4%	-0,6%	0,3%	-0,1%	0,0%	0,8%	-0,4%
Relative change in%	-10%	-10%	142%	-19%	-5%	31%	-12%

	EST	FIN	FRA	DEU	GRC	HUN	IRL
2005	0,21%	1,81%	10,26%	15,31%	0,55%	2,78%	4,40%
2015	0,33%	1,24%	8,39%	16,39%	0,43%	3,03%	6,84%
Absolute difference in percentage points	0,1%	-0,6%	-1,9%	1,1%	-0,1%	0,2%	2,4%
Relative change in%	55%	-32%	-18%	7%	-22%	9%	55%

	ITA	LVA	LTU	LUX	MLT	NLD	POL
2005	8,11%	0,11%	0,14%	3,56%	0,33%	4,99%	2,24%
2015	6,41%	0,17%	0,32%	5,56%	0,56%	5,38%	3,47%
Absolute difference in percentage points	-1,7%	0,1%	0,2%	2,0%	0,2%	0,4%	1,2%
Relative change in%	-21%	55%	136%	56%	68%	8%	55%

	PRT	ROU	SVK	SVN	ESP	SWE	GBR
2005	1,39%	0,66%	1,34%	0,70%	5,64%	4,58%	6,69%
2015	1,40%	1,00%	1,94%	0,59%	4,63%	2,69%	5,69%
Absolute difference in percentage points	0,0%	0,3%	0,6%	-0,1%	-1,0%	-1,9%	-1,0%
Relative change in%	1%	53%	45%	-15%	-18%	-41%	-15%

	ISL	NOR	CHE
2005	0,12%	1,50%	5,77%
2015	0,13%	1,15%	5,72%
Absolute difference in percentage points	0,0%	-0,3%	-0,1%
Relative change in%	6%	-23%	-1%

Fig. 10 Factory Europe: changes in foreign value added content of gross exports in the years 2005-2015, source: author's calculation, OECD-WTO TiVA Database.

When analyzing changes in absolute values, changes in the share of individual countries are not substantial. However, in the case of economies of small countries, the relative change was huge. The most significant increase was recorded in Bulgaria and Lithuania, respectively by 142% and 136%.

The majority of the new European Union member states recorded an increase in the range of 45% - 68%. Against this background, Hungary stands out with a slight increase of only 8%.

Conclusion

The conducted analysis confirms some of the hypotheses of Baldiwn and Lopez-Gonzales (2015) about the changes in the pattern in global value chains from 1995 to 2009. In 2005, GVC's are still mostly regional, not global. However, the rapid development of the world economy has significantly changed the economic ties between countries and regions around the world.

Regional economic integration, examples of which may be North America or Europe, stimulated the development of trade in goods and services. At the same time, the relationship between their main hubs - the most important and largest economies - were established and strengthened between regional economies. These are typical connections described in the literature as North - North (A NOTE). However, along with progressing globalization, north-south connections have gained importance. Developing countries have become increasingly important markets of supplier for semi-finished products as well as become markets for finished products. The relations in the global economy have changed. In the middle of the second decade of the 21st century, the Factory Asia has joined the already developed centers. The economic potential of this region of the world is immense, although Japan, for example, loses its importance. At the same time, a noticeable reduction in the importance of I2E in regions is associated with the increasingly important role of China (Figure 6). In the case of Factory Asia, China has become a center that further increases its links with Factory Europe and Factory North America.

Reducing the importance of Factory North America can be combined with several factors. The global financial and economic crisis, which began in the USA, was of crucial importance. An additional factor is a political change, which, combined with the protectionist policy of the government, has influenced one of the largest economies in the world - the USA.

The factor that has a particular impact on the development of Factory Europe is the level of development of regional economic integration related to the European Union. The enlargement of the Union at the beginning of the 21st century, as well as a new approach towards the creation of bilateral trade agreements, increased the dependence between economies, inside the Factory Europe. This increased trade dependencies related to I2E. This is particularly evident in the case of most of the 'new' EU Member States. There has been significant economic development and integration into regional and global value chains. On the other hand, only Germany maintained its dominant position, while other developed economies reduced their share in I2E in the analyzed period.

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